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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application No.:	09/841,636	Examiner:	E. M. MCAVOY
Confirmation No.:	6234	Art Unit:	1764
Filing Date:	April 24, 2001	Atty. Dkt. No.:	5659-03700/EBM
Inventors:	Wellington et al.		
Title:	IN SITU THERMAL PROCESSING OF A HYDROCARBON CONTAINING FORMATION TO PRODUCE A MIXTURE INCLUDING AMMONIA		

CERTIFICATE OF MAILING
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DATE OF DEPOSIT: 5/24/06

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Commissioner for Patents
Alexandria, VA 22313-1450

Jackie L. Pitre

REPLY BRIEF TO EXAMINER'S ANSWER

Mail Stop Appeal Brief-Patents
Commissioner for Patents
Alexandria, VA 22313-1450

Sir:

In response to the Examiner's Answer mailed March 24, 2006, Appellant present this Reply Brief. Appellants respectfully request that this reply brief be entered and considered by the Board of Patent Appeals and Interferences.

REPLY TO EXAMINER'S ANSWER

I. Grounds of Rejection To Be Reviewed On Appeal

Appellant agrees with Item (6) of the Examiner's Answer. There are no longer any provisional rejections under the judicially created doctrine of obviousness-type double patenting.

II. Grounds of Rejection

A. Rejections Under 35 U.S.C. §102(b), or 35 U.S.C. §103(a), over Lindquist

Item (9) of the Examiner's Answer includes the following statement: "The examiner is of the position that the products produced in Lindquist reasonably appear to be either the same as or an obvious variation of the instantly claimed product(s) because the products of the prior art are also produced from a coal hydrocarbon formation and in a similar way as compared to the claimed product." Applicant disagrees with the above-quoted statement.

The preamble of each of the independent claims on appeal includes the following phrase: "A mixture produced from a hydrocarbon containing formation". The claims on appeal are not limited to mixtures produced from coal formations.

The mixture produced from the hydrocarbon containing formation by processes of the present application are not the same as mixtures produced by the process taught and described in the Lindquist patent. The mixtures claimed in the present application are not produced in a "similar way" as the mixtures taught by the Lindquist patent. Lindquist teaches a process wherein: "a mixture of oxygen and steam is injected down an input well and is flowed into the formation through a lateral tube to produce product gas. Thus hydrocarbons can be recovered from heavy-oil fields by partial oxidation and thermal cracking of the hydrocarbons in situ."

In the present application, the mixtures produced from the formation would be significantly different. Initial formation treatment does not involve the introduction of oxygen into the formation to result in the production of partial oxidation products and thermally cracked hydrocarbons from production wells; therefore, the produced products would not include partial oxidation products resulting from the introduction of oxygen. For example, the mixture produced from production wells using the processes taught by the present application would contain little or no carbon monoxide. Because the reactions in the formation are primarily pyrolysis reactions, not primarily oxidation reactions as in Lindquist, the mixtures produced from the formation will be significantly different than the mixtures produced by the Lindquist process or similar processes. The temperature of the formation in the teachings of the present application for pyrolysis (i.e., for example from 270 °C to 400 °C as noted in the specification at page 80 lines 16-19) is significantly less than the temperature of the teachings of Lindquist which reached temperatures of 1500 °F (816 °C) within 3 hours of initiation (see column 6, lines 55-56). The difference in temperatures between the two processes would result in the generation of significantly different products. Applicant believes that the claimed mixtures are not anticipated or obvious in light of the cited prior art.

The processes of the present application heat the formation from heat sources in the formation. The formation heats from heat applied from the heat sources. The temperature of the formation, except immediately adjacent to the heat sources, does not rise to high temperatures. Such heating will result in significantly different product formation than heat caused by oxidation reactions that are at much higher temperatures. The claimed mixtures are not the same or an obvious variation of the mixtures producible using the teachings of the Lindquist patent.

Each independent claim describes a combination of features, including the feature of: "ammonia and water, wherein greater than about 0.5% by weight of the mixture comprises ammonia". The Examiner's Answer states: "Although ammonia (NH_4) is not specifically set forth in Lindquist, the examiner is of the position that its presence is largely dependent upon the specific underground hydrocarbon-containing formation of coal, oil shale, etc., being treated." The mere presence of nitrogen containing compounds in a formation will not necessarily result in

ammonia in the quantity described in the claims. The heating techniques described in Lindquist may not result in the production of ammonia because the temperature caused by oxidation are sufficient to result in the production of oxides of nitrogen instead of ammonia. Applicant believes that there would be little or no ammonia produced using the teachings of Lindquist regardless of the composition of the formation treated using the Lindquist process.

Ammonia is a chemical that is used in many ways and in many different industries. For example, one of the uses of ammonia is as a feedstock for forming fertilizer. Because ammonia has a positive value, the ability to produce ammonia would likely be mentioned if ammonia were generated or could be generated by the Lindquist process for treating a hydrocarbon containing formation. The presence of ammonia as claimed is believed to be novel and non-obvious in light of the cited prior art.

The Examiner states: "The examiner is of the position that the disclosure of Lindquist is not limited to the specific examples of the specification but to what is fairly taught to one of ordinary skill in the art." Applicant does not believe that Lindquist fairly teaches or suggests ammonia in a mixture produced from the formation in combination with the other features of the claims. Applicant requests removal of the anticipation and obviousness rejections of the claims.

Claim 4429 describes a combination of features, including the feature of "non-condensable hydrocarbons and H_2, wherein greater than about 10% by volume at 25 °C and one atmosphere absolute pressure of the non-condensable hydrocarbons and H_2 comprises H_2". The Lindquist patent lists the typical gas composition from an experimental run at column 6, lines 57-60. The gas composition presented removed carbon compounds with carbon numbers of 3 and 4. These compounds would be considered non-condensable components in light of the present application. Even with these components removed, the H_2 content of the Lindquist gas was only 2%. This value is 5 times lower than H_2 concentration claimed in claim 4429. Applicant does not believe that having greater than 10% by volume H_2 could be considered the same or an obvious variant of the mixture producible using the process of the Lindquist patent. Applicant requests removal of the rejection of claim 4429 and the claims dependent thereon.

With respect to the dependent claims of the application, the Examiner's Answer on page 7 states: "This is not deemed to be persuasive since Lindquist teaches olefins, C_1 to C_{10} hydrocarbons, etc., and the examiner maintains the position that any differences in molar ratios and amounts of these components would have been obvious to one of ordinary skill in the art as a routine modification of the product(s)." Applicant disagrees. The features of the dependent claims are additional features that further distinguish the produced mixtures from previously produced mixtures. For example, the paragraph beginning on page 141, line 29 of the specification explains why the ration of methane to C_{2-4} hydrocarbons is important. The paragraph includes the statement: "Such weight ratios indicate higher amounts of hydrocarbons with 2, 3, and/or 4 carbons (e.g., ethane, propane, and butane) than is normally present in gases produced from formations. Such hydrocarbons are often more valuable." Applicant believes that such features are not anticipated or obvious in light of the cited prior art. There would be no "routine modification" that could be made to result in the claimed mixtures. Applicant believes that the claims are novel and are non-obvious in light of the prior art.

B. <u>Rejections Under 35 U.S.C. §112, Second Paragraph</u>

The Examiner states: "to the extent it can be argued that the claimed compositions are novel or unobvious, the claimed subject matter has not been described in the specification in such a way as to enable one skilled in the art to make and/or use the invention, i.e., applicants have not identified the chemical characteristics of the coal formation from which the claimed product is derived." Applicant disagrees that the claims are limited to compositions produced from "coal formations". In addition, Applicant believes that the specification does identify chemical characteristics of hydrocarbon containing formations from which the claimed product is derived.

The claims relate to compositions from "hydrocarbon containing formations". At the beginning of the Detailed Description Of The Invention section of the specification, Applicant provides the following sentence that lists examples of a hydrocarbon containing formation: "The following description generally relates to systems and methods for treating a hydrocarbon

containing formation (e.g., a formation containing coal (including lignite, sapropelic coal, etc.), oil shale, carbonaceous shale, shungites, kerogen, oil, kerogen and oil in a low permeability matrix, heavy hydrocarbons, asphaltites, natural mineral waxes, formations wherein kerogen is blocking production of other hydrocarbons, etc.)" (page 38, lines 6-10). The above-quoted sentence shows that the term "hydrocarbon containing formations" is broader than "coal formations" referred to by the Examiner.

The Examiner states: "As to pages 51 through 56 of the specification, those pages contain a general description on which a coal formation may be selected (e.g., "richness, thickness and depth"), but fail to teach or disclose the chemical composition of the coal formation required to produce the claimed composition." Applicant respectfully disagrees with the Examiner's characterization of the section as applying to coal. Applicant also respectfully disagrees with the Examiner's conclusion that the section fails to teach or disclose the chemical composition of formations able to produce the claimed composition.

The referenced pages discuss kerogen. As defined in the specification, "Kerogen" is generally defined as a solid, insoluble hydrocarbon that has been converted by natural degradation (e.g., by diagenesis) and that principally contains carbon, hydrogen, nitrogen, oxygen, and sulfur. Coal and oil shale are typical examples of materials that contain kerogens." (page 38, lines 24-27). The referenced section of the specification is not limited to coal.

The referenced pages do describe characteristics of the material that relate to the chemical composition of the material. For example, the referenced pages discuss vitrinite reflectance of a kerogen.

> Hydrocarbon containing formations that include kerogen can typically be assessed/selected for treatment based on a vitrinite reflectance of the kerogen. Vitrinite reflectance is often related to a hydrogen to carbon atomic ratio of a kerogen and an oxygen to carbon atomic ratio of the kerogen, as shown by the dashed lines in Fig. 2. For example, a van Krevelen diagram may be useful in selecting a resource for an in situ conversion process.

> Vitrinite reflectance of a kerogen in a hydrocarbon containing formation tends to indicate which fluids may be produced from a formation upon heating. For example, a vitrinite reflectance of approximately 0.5 % to approximately 1.5 % tends to indicate a kerogen that, upon heating, will produce fluids as described in region 7 above. Therefore, if a hydrocarbon containing formation having such kerogen is heated, a significant amount (e.g., majority) of the fluid produced by such heating will often include oil and other such hydrocarbon fluids.
> (page 52, lines 12-24).

As described in the above-quoted section, vitrinite reflectance is related to the chemical composition of the hydrocarbons. Also, vitrinite reflectance may be used as an indicator to determine which fluids will be produced from the hydrocarbon containing formation when the formation is treated with a process described in the specification.

The referenced pages include a discussion of choosing a formation based on oxygen content of the formation. The referenced pages also include a discussion of choosing a formation based on moisture content of the formation. These characteristics and others, as well as the richness, thickness and depth of the hydrocarbons, are described in the specification in reference to selecting a formation for treatment.

Applicant believes that the specification describes the selection of formations in such a way as to enable one skilled in the art to make and/or use the invention. Applicant requests removal of the 35 U.S.C. §112, second paragraph rejections of the claims.

III. Conclusion

For the above-noted reasons, it is submitted that the rejections of claims 4429-4448 and 5396-5405 are erroneous. Reversal of the rejections is respectfully requested.

Respectfully submitted,

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